The Ways of Water Pages 91-96

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 Otmar grober

After completing his training as an industrial engineer, Otmar Grober worked in plant engineering and maintenance. Further training

in the field of installation management gave him the opportunity to work in various locations across Western Europe. When Otmar Grober

took up the position of master river engineer for the Austrian state of Styria he started to explore new approaches to sustainable flood protection. He has been carrying out nature-based river conservation and rehabilitation projects since 1989. The teachings of Viktor Schauberger, the famous water scientist, have been a great influence on Grober’s work. In 2001, he received the state of Styria’s environmental award.

River cycles

Whenever rivers overflow and human possessions are damaged, people are quick to demand more effective flood control. Conventional water engineering attempts to keep rivers from flooding by building solid linings and cementing riverbanks. This is expensive but often not very successful, and it impairs rivers’ ecosystems. However, alternatives do exist that are viable, aesthetically appealing, and ecologically compatible.

Water is the defining force for the surface of the Earth. Nearly every physical aspect of our landscape is shaped or influenced by water. Water can break apart cliffs and dis-solve even the hardest rocks, thus ultimately eroding the highest mountains. Stones, pebbles and sand are washed away, valleys and canyons carved out, and the deposition of sediment in extensive flood plains forms fertile deltas at the mouths of rivers. Until

about 200 years ago, the flow of water was free and balanced, but then human activities began to seriously interfere with the dynamics and laws of nature. Gradually, we shaped today’s cultural landscape, with its advantages and disadvantages – improved land use on one hand, loss of biodiversity and harm to biological systems on the other.

But our connection to water is not just physical. Since ancient times, water has also accompanied us emotionally and spiritually in its subtle role as a carrier of information. Water plays an important role in all religions. Water is also of special significance in the Christian religion. All apparitions of Mary are intrinsically linked to water. Water, one could say, connects us to the spiritual world. Knowing this, we should ideally carry out all our activities with and near water, and treat this elixir of life with the respect it deserves and be humble in our actions. I am a river engineer and for 33 years I have been responsible for the ecological conservation of some 600 kilometers of river courses in the Austrian state of Styria. Initially I studied conventional water engineering, which uses solid control structures in an attempt to impose human will on rivers by squeezing them into tight corsets. However, I believe this approach is counterproductive. But it is not enough to start tearing down embankments to give rivers more room. The laws of nature were made by higher powers, and success can be achieved only if these laws are understood and respected. Whenever intervention is needed to protect homes and other things of value, we should keep in mind that bodies of water, as an element of the landscape, are balanced organisms that have got on perfectly well without us for most of time. Any analysis must take account of relevant geological and climatic conditions, as these are of vital importance to the development of river landscapes. These features have influenced the harmonious and energy-balanced ways in which waterways shaped their riverbeds. Anyone who wishes to contribute to the natural conservation and maintenance of waterways must develop an intimate relationship with the river landscape, exploring its properties and interactions. I am convinced that to do this we need more information about rivers than technical analysis and conventional hydrographic data can give us.

A new way of looking at water

I can sense visible and invisible energy in rivers. The power of watercourses is particularly impressive when water levels are high. Hydropower is familiar to us as another visible form of energy, mainly making use of the drop height of water. Flow energy, powering simple waterwheels, is less obvious. The efficiency of waterwheels would

significantly increase if we knew how to take advantage of secondary cur-

rents. But cross currents and vortices are generally not widely identified, and their value is not appreciated. Yet it is precisely the energies that are still invisible (in other words, which cannot be physically measured) that activate the most important synergies needed to make life possible in and along rivers. From my point of view, they represent what is most valuable, but they are also the most challenging aspect of handling water.

Water’s deeper mysteries still remain widely unknown to us. Nevertheless, we should be open and receptive to the way in which water’s laws manifest themselves in nature. That is the only way we can successfully work with nature and its forces without subjecting them to violence, for violence inevitably breeds violence. Restrictions are naturally followed by aggression and disruption. This applies to our rivers as well – we need to find effective ways to invite water with its intrinsic natural energy to cooperate with us. Goals such as the protection of populated areas, would be a welcome and positive side effect.

So the important thing is to gather experience on how to use water’s natural energy to protect it. We have learned that this is best done with water’s own building materials, such as roots and drift wood. They help us to keep required construction work at a minimum, and in contrast to cement and stone river linings, they do not impose artificial-looking structures on the landscape. These natural bank and flood protection measures are just as good as conventional structures.

We can learn about nature-based engineering by carefully observing river and stream courses throughout the year, especially during floods. Viktor Schauberger, a forest warden and exceptional observer of nature, was a pioneer in this field. As far back as 70 years ago, he said, »Never regulate the flow of a river from its banks, but from its interior, from the flowing medium itself«. Today his approach can be expanded and improved upon with the use of modern construction machinery.

Initial experiments with the careful use of a river ecosystem’s own construction materials such as root balls, dry underwood, drift

wood and wood washed up on the river-banks, in coordinated combination with rooted alder and willow saplings brought in by machines, and a layout suited to the river’s course, have shown that riverbank areas can be successfully stabilized in this way. Roots and branches are moved by the water current and a whirling, sliding layer is created, allowing water to flow harmlessly over water, somewhat like the way sharkskin works, before it has a chance to reach the top of the riverbank. In contrast to solid river linings, this natural system largely keeps the friction force of flowing water well away from the riverbank. Newly planted tree and scrub vegetation can grow in peace and fulfill its purpose as bank protection.

Viktor Schauberger also developed another basic principle for controlling water flow. This consists of deflecting the current to the centre of the riverbed. This is not achieved by building conventional river linings, but by placing elements under water in the centre of the river floor. Rounded stone blocks near the river bottom use the water’s flow energy to guide the main current to the centre or to the bottom of the riverbed,

away from the riverbank area at risk. It is even possible to keep the water’s flow energy completely away from the banks under low or average water conditions. These measures make it possible to reduce bank protection that might be needed otherwise. Outer banks are spared from destruction during flooding. By concentrating flow

energy in the middle of the river, gravel and rock debris are carried away with the flood, preventing the buildup of sediment in the slowly flowing areas of the inner banks which would eventually change the course of the river. This has a welcome side effect – we do not have to clear gravel bars after floods, which is labour intensive and expensive, and

harmful to the river’s living organisms. As a whole, the river changes for the better. By deflecting the current to the river floor, multiple vortices are created which cause the water to cool slightly and increase dynamic flow under low water conditions. There are various ways to stabilize a river from within. Flow funnels enable us to concentrate the flow energy in the centre of the river. Large rocks and boulders are anchored to the river floor, forming a funnel that increases flow rate in the middle of the

river, taking pressure off the banks and decreasing bank erosion. Studies carried out by the University of Graz have confirmed that this principle concentrates flow force in the middle of a river. When building a water snail, we place rocks and stones on the river floor so that the water flows in inward spirals. The water flows over the stone steps placed at a slight

angle towards the inside of the bend. This also works at low water levels. The water’s energy is guided in and downwards, swirling sediment up from the river floor and depositing it on the bank. The current is directed towards the centre of the river even when water levels are high. The water spirals inwardly, picking up speed as it whirls downwards. Th

is is because the snail shape becomes narrower and narrower in diam-

eter the closer it gets to the riverbed. Creating an inward spiral successfully protects a river’s outer banks from erosion, as was shown in the case of the Suhre river in the canton of Lucerne. Pendulum ramps have proven to be useful in reducing flow rate and energy in streams

with steep gradients. Ramps are made of large boulders and rocks placed transversely to the direction of the river’s flow, but in such way as to make the water move from left to right in a pendulum pattern, thus diminishing flow momentum. Meanwhile we have learned that the slowing effect of the pendulum movement also occurs under high water conditions, although this is not visible on the surface. Pendulum ramps apparently also improve conditions in a river’s ecosystem. Willow saplings that were planted

on the riverbank 300 meters above the ramp grew 80 centimeters in the

first year, and those planted below below the ramp grew 220 centimeters. This inner change was also confirmed in bioresonance scans (System Pier Rubesa and Walter Thut, Switzerland).

As we have seen again and again, nature-based river revitalization not only offers flood protection, but also vitalizes river ecosystems overall. Water quality is demonstrably better, and plant growth in and around rivers more dynamic. This results in improved living conditions for fish and other aquatic organisms, reflected locally in larger fish stocks and greater biodiversity. It is not surprising that sport fishermen, skeptical at first, now call for more rehabilitation projects following these principles.

The use of a river’s own natural materials and the river’s acceptance of them in an effective but very unobtrusive construction plan based on natural principles results in these measures naturally and harmoniously blending into the landscape. In addition to biological and structural advantages, these methods also offer consider able financial benefits. As a result of using nature-based construction techniques, these

installations can withstand floods immediately upon completion. Material and labour input are comparatively small because most of the materials come from the river area, and construction activities can be reduced to a minimum. Moreover, the recreational value of the revitalized river landscapes is enhanced. The most important lesson I learned in years of nature-based river engineering is that it depends on knowledge gained from experience. Before we can even begin planning a project, we have to know the ways of a river. If we are to live and work with the natural

environment in a sustainable way, we must draw on everything we know about the laws and dynamics of nature to optimize our use of available energies, and apply them with as little effort as possible. We must strive to learn more about water’s own abilities to organize and purify itself so that we can deal appropriately with the challenges facing our waters in future. Only when we have gained insight into nature’s unique properties,

complexities and interactions will we succeed in designing balanced, natural landscapes – on the one hand because the interventions needed will be on a much smaller scale, and on the other, because our waterways will continue to provide their inhabitants with a diverse and dynamic habitat.

We live in an age in which property is becoming increasingly valuable, and in which we use land more and more intensively. It is up to us to make sure that our river ecosystems thrive and survive. Water is our most precious resource and it needs its own space otherwise our source of life might just disappear.

»Every river has its own character. I know my rivers by ear. Every river has its own sound

and melody.«

OTMAR GROBER